Red Wolf

Recovery Program

Wild red wolf, northeastern North Carolina
Photo credit: Ryan Nordsven/USFWS

2nd Quarter Report

January – March 2014

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www.fws.gov/redwolf

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The Red Wolf Recovery Program

The red wolf (*Canis rufus*) is one of the most endangered canids in the world. Once occurring throughout the eastern and south-central United States, red wolves were decimated by predator-control programs and the loss and alteration of habitats. By the 1970s, these activities had reduced the red wolf population to a small area along the Gulf coast of Texas and Louisiana. To protect the species from extinction, the U.S. Fish and Wildlife Service initiated efforts to locate and capture as many red wolves as possible for the purposes of establishing a program to breed the species in captivity and one day reintroduce the species into a portion of its former range. More than 400 canids were captured in coastal areas of Texas and Louisiana, but only 17 were identified as pure red wolves. Fourteen of these wolves would become the founding members of the captive-breeding program and the ancestors of all red wolves existing today.

The first litter of red wolves born in captivity occurred in 1977. Within a few years red wolves were successfully reproducing in captivity, allowing the U.S. Fish and Wildlife Service to consider reintroducing the species in the wild. In 1987, four male-female pairs of red wolves were released in Alligator River National Wildlife Refuge (ARNWR) in northeastern North Carolina and designated as an experimental population. Since then, the experimental population has grown and the recovery area expanded to include four national wildlife refuges, a Department of Defense bombing range, state-owned lands, and private lands, encompassing about 1.7 million acres.

Adaptive Management

The recovery and restoration of red wolves requires the careful management of eastern coyotes (*C. latrans* var.) and occasionally wolf-coyote hybrids in the red wolf recovery area. The non-native coyotes spread across North Carolina to the red wolf recovery area in the early to mid-1990s. It soon was recognized that interbreeding between red wolves and eastern coyotes would produce hybrid offspring resulting in coyote gene introgression into the wild red wolf population, and that this introgression would threaten the restoration of red wolves. An adaptive management plan was developed to reduce interbreeding and introgression while simultaneously building the red wolf population. The adaptive management plan effectively uses techniques to capture and sterilize hormonally intact coyotes via vasectomy or tubal ligation, then releases the sterile canid at its place of capture to act as a territorial "placeholder" until the animal is replaced by wild red wolves. Sterile coyotes are not capable of breeding with other coyotes, effectively limiting the growth of the coyote population, nor are they capable of interbreeding with wild red wolves, limiting hybridization events. In addition, the sterile canid will exclude other coyotes from its territory. Ultimately, the placeholder canids are replaced by the larger red wolves either naturally by displacing the coyote or via management actions (e.g., removal of the coyote followed by insertion of wild or translocated wolves). Coyotes that are captured on private property are euthanized at the landowner's request.

Currently, adaptive management efforts are making progress in reducing the threat of coyotes to the red wolf population in northeastern North Carolina. Other threats, such as habitat fragmentation, disease, climate change, and anthropogenic mortality, also are of concern in the restoration of red wolves. Efforts to reduce these threats are presently being explored.

Program Objectives

The current recovery plan (U.S. Fish and Wildlife Service, 1990) specifies the following objectives:

1) Establish and maintain at least three red wolf populations via restoration projects within the historic range of the red wolf. Each population should be numerically large enough to have the potential for allowing natural evolutionary processes to work within the species. This must be paralleled by the cooperation and assistance of at least 30 captive-breeding facilities in the United States.
2) Preserve 80% to 90% of red wolf genetic diversity for 150 years.
3) Remove threats of extinction by achieving a wild population of approximately 220 wolves and a captive population of approximately 330 wolves.

4) Maintain the red wolf into perpetuity through embryo banking and cryogenic preservation of sperm.

Northeastern North Carolina Restored Population

We estimate between 90 and 110 red wolves in the Red Wolf Recovery Area, but for the purposes of this report all population figures are comprised only of known canids (i.e., those that are regularly monitored through either a functioning radio-collar or surgically implanted abdominal radio transmitter). Additional wolves are likely present, but have not been captured/radio-collared or their continued presence otherwise confirmed.

Beginning with the first quarter of the fiscal year 2012 (FY12) we have changed the way we report population and pack numbers. This change more accurately represents the managed population of canids that are part of our efforts to restore red wolves. The managed population includes wolf packs (i.e., packs consisting entirely of wolves) and mixed packs (i.e., packs of a wolf and sterile coyote pair). A pack is defined as at least two known canids cooperatively inhabiting an established territory.

Population and Territory Status

A total of 69 known red wolves occupied the Red Wolf Recovery Area (i.e., 1.7 million acres in five counties in northeastern North Carolina) at the end of the second quarter of our fiscal year 2014 (FY 14). The population includes 9 wolf packs (comprised of 41 wolves and 7 breeding pairs), and 8 mixed packs (comprised of 8 wolves and 8 sterile coyotes). An additional 20 wolves are not known to be associated with a pack.

A total of 69 sterile coyotes were monitored in the Red Wolf Recovery Area at the end of this quarter.

Pairings

Two breeding pairs of red wolves were lost during the quarter. One of the losses occurred when the breeding female drowned in a private trapper's trap, and the second occurred when the breeding male died of natural cause.

There was no change in the number of mixed (wolf/sterile coyote) pairs during the quarter.

Captures and Radio-Telemetry Marking

18 red wolves were captured during the quarter, 12 of which were first-time captures. All first-time captures were fitted with radio-telemetry collars (VHF or GPS) or surgically implanted with abdominal radio transmitters, and released. Captured red wolves consisted of 7 males and 11 females; 4 adults (>2 years), 3 juveniles (1-2 years), and 11 pups (<1 year of age).

14 coyotes were captured and released during the quarter, all of which were first-time captures. All captured coyotes were sterilized before being radio-collared and released, and consisted of 7 males and 7 females.

Dispersals

No known wolves dispersed from their natal territories during the quarter.

Displacements

No known displacements occurred during the quarter.

Mortalities

Four adult wolves (3 males, 1 female) from the Red Wolf Recovery Area are known to have died during the quarter. One of the deaths was from natural cause, one drowned in a trap set by a private trapper, and two died from gunshot and are under investigation by the U.S. Fish and Wildlife Service's Office of Law Enforcement. The fifth wolf found dead this quarter is suspected of having been taken illegally during the previous quarter; the case currently is under investigation by the U.S. Fish and Wildlife Service's Office of Law Enforcement.

Four sterile, radio-collared male coyotes were known to have died during the quarter – one the result of gunshot, one from interspecific aggression (i.e., a wolf), and two euthanized after being caught by a private landowner.

Disappearances

The Red Wolf Recovery Program lost radio contact with 2 radio-collared, sterile coyotes during the quarter.

Pack Summaries

The Pack Summaries *section has been indefinitely discontinued due to recent events and current circumstances involving the apparent illegal take of red wolves within the Red Wolf Recovery Area.*

Species Survival Plan (SSP) Managed Population

Red Wolf Species Survival Plan (RWSSP) cooperating facilities are coordinated and managed by the RWSSP Coordinator, Will Waddell, and based at Point Defiance Zoo & Aquarium (PDZA) in Tacoma, Washington. The RWSSP is guided by a steering committee currently comprised of representation from the North Carolina Museum of Life and Science (Durham, NC), Chattanooga Arboretum and Nature Center (Chattanooga, TN), North Carolina Zoo (Asheboro, NC), Wolf Conservation Center (South Salem, NY), Miller Park Zoo (Bloomington, IL), and Western North Carolina Nature Center (Asheville, NC). The RWSSP also benefits from a volunteer advisory board in the fields of veterinary medicine (Dr. Karen Wolf, PDZA), reproduction (Dr. Karen Goodrowe Beck, PDZA), education (Craig Standridge, PDZA), population biology (Sarah Long, Lincoln Park Zoo), *in situ* population management (Dr. David Rabon, USFWS), and pathology (currently vacant). The following information is based on activities completed or conducted by the RWSSP Coordinator during the quarter reported.

RWSSP Population Status

The RWSSP coordinates 43 captive facilities (e.g., approved zoos and nature centers) throughout the United States, housing 191 wolves ranging from pups to geriatrics, at the end of this quarter.

Breeding / Transfer Recommendations

The RWSSP Coordinator reported that a total of total of nine wolves involving six different RWSSP facilities were transferred this quarter, including three females were transferred from Connecticut's Beardsley Zoo (Bridgeport, CT) to Binghamton Zoo at Ross Park, NY (a new RWSSP cooperator).

Mortalities

Two adult male wolves housed at the North Carolina Zoo (Asheboro, NC) and PDZA (Tacoma, WA) off-site facility were euthanized as a result of age/health related causes.

SSP Facilities Updates

One new cooperator – Binghamton Zoo (Ross Park, NY) – joined the RWSSP program in the second quarter. They received three female wolves from Connecticut's Beardsley Zoo.

Thank you to the North Carolina Zoo, North Carolina State University College of Veterinary Medicine (Raleigh, NC), Akron Zoo (Akron, OH), and PDZA for providing samples associated with the project to investigate the prevalence, clinicopathological and demographic characteristics of inflammatory bowel disease in red wolves.

The Red Wolf Recovery Program received $300 from the Wolf Conservation Center (South Salem, NY) to equip the recently transferred breeding male wolf on St. Vincent Wildlife Refuge with its first radio-collar. We sincerely thank Wolf Conservation Center for this generous donation.

Other Activities

The 2013 International Red Wolf Studbook was completed and distributed to designated individuals and organizations as required by the World Association of Zoos and Aquariums (WAZA) International Studbook distribution list and posted on the Association of Zoos and Aquariums (AZA) Website.

Dr. Karen Wolf, RWSSP Veterinary Advisor, and W. Waddell, RWSSP Coordinator, visited the NENC recovery area as part of the initial development of a canid disease monitoring and prevention program for red wolves.

Dr. Katie Seeley, Veterinary Intern at PDZA, is conducting a retrospective review of red wolf mortalities in the RWSSP over the last 15 years to gather information about the status of the red wolf population and identify major causes of mortality. Participating institutions were asked to submit gross necropsy and histology reports of the wolves that had been housed at their facilities. This information is currently being analyzed to identify trends within the RWSSP population and support long-term RWSSP management.

During this quarter, two red wolf proposals were awarded funding through PDZA's Dr. Holly Reed Conservation Fund.

1) Red Wolf (*Canis rufus*) Genome Resource Banking - integrating reproductive sciences into conservation programs (Award amount = $16,200).
   Project investigators: K. Goodrowe-Beck and W. Waddell.
   The purpose of this 3 year project is to expand semen collection, evaluation, processing, and cryopreservation of red wolf sperm beyond individual males maintained in the PDZA RWSSP population. To diversify samples collected for banking and thereby increase the gene diversity of the red wolf genome resource banking, sperm will be collected from individuals in the population at several other RWSSP institutions within identified U.S. geographic regions. Additionally, comparing the success of surgical and transcervical artificial insemination techniques using fresh (years 1 & 2) and frozen-thawed (years 2 & 3) semen will be evaluated.

2) Inflammatory bowel disease in the red wolf (*Canis rufus*): prevalence, clinicopathologic and demographic characteristics – continuation/extension from 2013 (Award amount = $3568.50). *Project investigators*: K. Wolf, K. Anderson, M. Garner, and W. Waddell.
   This project is an extension of work that was funded in 2013 and will further investigate gastrointestinal inflammatory response in affected red wolves fed a limited antigen commercial diet combined with the application of steroidal and ancillary therapeutics. Funding will also allow Dr. Karen Wolf the opportunity to share preliminary findings at the RWSSP meeting this summer and at the joint Association of Zoos & Aquariums Canid/Felid Taxon Advisory Group meeting at the National Zoo's Smithsonian Conservation Biology Institute (SCBI) in Front Royal, Virginia.

Island Propagation Sites

The U.S. Fish and Wildlife Service utilizes island sites to propagate red wolves and contribute to the restoration of a wild red wolf population, primarily by inserting island-born wolves into the wild population as a means to augment the wild red wolf gene pool with “under-represented” genes from the captive population. Currently, the Red Wolf Recovery Program cooperates with St. Vincent National Wildlife Refuge in maintaining a breeding pair of red wolves on an island site.

The new breeding pair of red wolves was held together in an acclimation pen most of the quarter. The female was examined by a local veterinarian to assess reproductive condition and fitted with a new radio-collar in early January. In late February, refuge staff conducted a pre-release visual health check and verified both radio-collars were properly working. Both animals appeared to be in good physical condition, and the pair was released in early March.

Collaborations

Research

The Red Wolf Recovery Program provided financial and in-kind support for collaborative research with scientists at other institutions, including universities, interagency divisions, and non-government research organizations. These investigations required project staff to assist outside researchers and graduate students in their efforts to better understand red wolf ecology, ecosystem function, and conservation efforts.

Project Title: Prevalence of cystic endometrial hyperplasia and its effect on reproduction in the red wolf (*Canis rufus*).
Graduate Student: n/a
Committee Chair/Principal Investigator: Kadie Anderson, DVM, and Karen Wolf, DVM, Dipl. ACZM, Point Defiance Zoo & Aquarium (PDZA)

Project Title: Inbreeding avoidance in red wolves.
Graduate Student: Kristin Brzeski (PhD student)
Committee Chair/Principal Investigator: Sabrina Taylor, PhD, Louisiana State University
*Kristin recently received a Doctoral Dissertation Improvement Grant from the National Science Foundation to examine immunocompetence and disease resistance in the wild red wolf population.

Project Title: Red Wolf (*Canis rufus*) Genome Resource Banking - integrating reproductive sciences into conservation programs.
Graduate Student: n/a
Committee Chair/Principal Investigator: Karen Goodrowe-Beck, PhD, and Will Waddell, Point Defiance Zoo & Aquarium (PDZA)

Project Title: Identifying management procedures to reduce red wolf-coyote interactions in eastern North Carolina.
Graduate Student: Joseph Hinton (PhD student)
Committee Chair/Principal Investigator: Michael Chamberlain, PhD, University of Georgia

Project Title: Use of stable isotope analysis to elucidate predation patterns of sympatric canids.
Graduate Student: Anne-Marie Hodge (MS student)
Committee Chair/Principal Investigator: Brian Arbogast, PhD, University of North Carolina at Wilmington

Project Title: Evaluating potential effects of widening US Highway 64 on red wolves, Washington, Tyrrell, and Dare Counties, North Carolina.
Graduate Student: Christine Proctor (PhD student)
Committee Chair/Principal Investigator: Michael R. Vaughan, PhD, Virginia Polytechnic Institute and State University (Virginia Tech)

Project Title: Inflammatory bowel disease in the red wolf (*Canis rufus*): prevalence, clinicopathologic and demographic characteristics.
Graduate Student: n/a
Committee Chair/Principal Investigators: Karen Wolf, DVM, Dipl. ACZM, Kadie Anderson, DVM, and Will Waddell, Point Defiance Zoo & Aquarium (PDZA); Michael Garner, DVM, Dipl. ACVP, Northwest ZooPath

Project Title: Canid disease monitoring and prevention program plan for the conservation of red wolves (*Canis rufus*).
Graduate Student: n/a
Committee Chair/Principal Investigators: Will Waddell, Karen Wolf, DVM, Dipl. ACZM, Point Defiance Zoo & Aquarium (PDZA); David Rabon, PhD, and Becky Harrison, PhD, USFWS

Project Title: Population viability analysis and demographic models of red wolves (*Canis rufus*).
Graduate Student: n/a
Committee Chair/Principal Investigators: Becky Harrison, PhD, David Rabon, PhD, USFWS; Lisa Faust, PhD, Sarah Long, MS, Lincoln Park Zoo; Will Waddell, Point Defiance Zoo & Aquarium (PDZA)

Project Title: Space use and survival of sterile "placeholder" coyotes (*Canis latrans*) in the conservation and management of red wolves (*Canis rufus*).
Graduate Student: n/a
Committee Chair/Principal Investigators: Eric Gese, PhD, Utah State University; Becky Harrison, PhD, David Rabon, PhD, USFWS

Publications

The following publications have gone to print in this quarter. A complete list of publications related to red wolves can be found at http://www.fws.gov/redwolf/images/RWBibliography.pdf.

Hinton, J.W. 2014. Red wolf (*Canis rufus*) and coyote (*Canis latrans*) ecology and interactions in northeastern North Carolina. PhD Dissertation. University of Georgia.

Presentations

No presentations by collaborators were reported during this quarter.

Staff and Volunteers

The Red Wolf Recovery Program employs eight full-time staff, including the Program Coordinator, Assistant Coordinator, Field Coordinator, three Wildlife Biologists, a Biological Technician, and an Administrative Assistant. The Red Wolf Recovery Program also benefits from unpaid interns (Caretakers).

Outreach

Staff from the Red Wolf Recovery Program conduct presentations and attend events to inform and educate the public on the conservation needs of the red wolf and the restoration efforts of the Red Wolf Recovery Program. As part of our effort to assist educators, red wolf "discovery boxes" that include materials about the red wolf are distributed to educational facilities. The distribution of discovery boxes is managed by the Red Wolf Coalition. Requests for discovery boxes should be made to kwheeler@redwolves.com.

The Red Wolf Recovery Program also seeks to achieve a quality visitor and participant experience in the U.S. Fish and Wildlife Service's priority recreational uses on National Wildlife Refuges. Our outreach

efforts focus on four of the six program elements, including wildlife observation, wildlife photography, environmental education, and interpretation, and are conducted frequently in partnership with ARNWR and Pocosin Lakes National Wildlife Refuge (PLNWR) educators and volunteers.

Presentations

Date	Location	Audience	Length	Attendance	Presenter
March 3	Manteo, NC	UNC-Wilmington	1 hr	15	B. Harrison
March 6-7	Manteo, NC	ENC/SEVA Team Meeting	1 hr	20	D. Rabon

Website / Social Media

The Red Wolf Recovery Program has launched several social media sites. Our Facebook page connects the Red Wolf Recovery Program with "friends" from around the world and informs them of our conservation efforts. The Facebook page can be found at www.facebook.com/redwolfrecoveryprogram. Our Flickr page provides a site for users to view and download high resolution pictures related to red wolves and the Red Wolf Recovery Program. Our Flickr page can be found at www.flickr.com/photos/trackthepack.

The Red Wolf Recovery Program also has a weblog that highlights the efforts of the Red Wolf Recovery Program staff in the conservation of the red wolf. The weblog combines text, images, videos, and links to other media related to its topic. The content includes educational, informational, and general journal entries written by program staff, and allows readers to leave comments in an interactive format. The weblog can be found at trackthepack.blogspot.com.

Media Inquires

The Red Wolf Recovery Program responded to numerous media inquiries during this quarter, including the Virginian Pilot (Norfolk, VA), North Carolina Wildlife Federation, National Wildlife Magazine, NPR, and several freelance writers.

Partnerships

Red Wolf Coalition

The Red Wolf Coalition (RWC), a not-for-profit education organization based in Columbia, NC, advocates for the long term survival of wild red wolf populations by teaching about red wolves and by engaging the public in red wolf conservation. The RWC's web site (www.redwolves.com) provides information about the history, biology, and ecology of red wolves, as well as news about red wolf restoration. The RWC gives red wolf programs to school groups, professional organizations, university students, and other groups. The RWC also conducts workshops for teachers and non-formal educators, including people seeking certification in environmental education.

The RWC Executive Director reported conducting several education programs during the quarter, including presentations to visitors at the Red Wolf Education & Healthcare Facility, including groups from North Carolina Wildlife Federation, NC Museum of Science, Carolina Nature Photography, and Southern Environmental Law Center. Reservations are required for those wishing to visit the center and can be scheduled online (http://redwolves.com/program/) or by phone (252-796-5600). Additionally, the RWC presented to 15 visitors on PLNWR.

The RWC received a grant in 2013 from the Akron Conservation Fund that was used to purchase transportation crates for the RWSSP program. We are very grateful to the Akron Conservation Fund for their support of red wolf conservation. Monies from this grant were also used to purchase tracking collars for the red wolves in the wild.

The RWC worked with the NC Wildlife Federation (NCWF) on their campaign to draw attention to the effects of climate change on the environment. The full report is available at: http://www.nwf.org/News-and-Magazines/Media-Center/Reports/Archive/2014/03-11-14-Mascot-Madness.aspx

The RWC also has three Red Wolf Discovery Boxes for all grade levels available for educational use. These boxes are filled with a variety of hands-on items, activities and artifacts that help students explore the world of red wolves. The red wolf curriculum *Far Traveler* and a variety of books and other resources also are included. Contact Kim Wheeler at (252) 796-5600 or kwheeler@redwolves.com for more information or to reserve your Red Wolf Discovery Box. The RWC sent Discovery Boxes to multiple schools this quarter including educators in New York and Washington. The Coalition gave education programs using the Discovery Boxes in local middle schools in Chowan and Washington Counties.

Friends of the Red Wolf

The Friends of the Red Wolf (FORW) is a non-profit organization established to support the conservation and recovery of wild red wolves. The FORW is a program affiliate of The WILD Foundation (www.wild.org), which shares its 501(c)(3) non-profit status, and enables all donations to be tax-deductible as charitable contributions. Their work is informed by sound scientific research and adaptive management practices. They collaborate directly with the Red Wolf Recovery Program to help them achieve recovery goals for the red wolf. Their web site (friendsofredwolves.org) provides information about the ecology of red wolves, as well as news and updates about red wolf restoration.

Announcements

The U.S. Fish and Wildlife Service published two press releases requesting assistance with investigations on the recent suspected illegal take of a number of radio-collared red wolves. The press releases can be found at http://www.fws.gov/southeast/news/. Anyone with information that directly leads to an arrest, a criminal conviction, a civil penalty assessment, or forfeiture of property on the subject or subjects responsible for the suspected unlawful take of a red wolf may be eligible for a reward. The Service is offering a reward of $2,500 for information that leads to the successful prosecution in this case. Anyone with information on the death of a red wolf is urged to contact Resident Agent in Charge John Elofson at (404) 763-7959, Refuge Officer Frank Simms at (252) 216-7504, or North Carolina Wildlife Resources Commission Officer Robert Wayne at (252) 216-8225.